



TMU Faculty Dr.Vipin Kumar <drvipink.engineering@tmu.ac.in>

Regarding BoS

2 messages

TMU Faculty Dr Amit K Sharma <dramit.engineering@tmu.ac.in>
To: Dr Shri Prakash Pandey <drspandey.engineering@tmu.ac.in>, TMU Faculty Dr Ajay K Upadhyay <drjayk.engineering@tmu.ac.in>, Dr Diptonil Banerjee <drdiptonil.engineering@tmu.ac.in>, "TMU Faculty Dr. Parag Agarwal" <drparag.computers@tmu.ac.in>, "Dr. Amit Gangwar TMU Faculty" <amitg.engineering@tmu.ac.in>, Dr Pavan Kumar Singh <pavan.engineering@tmu.ac.in>, Dr Vishnu Prasad Shrivastava <vishnu.engineering@tmu.ac.in>
Cc: TMU Principal College of Computing Sciences and Information Technology <principal.computers@tmu.ac.in>, Vice-Principal Faculty of Engineering <viceprincipal.engineering@tmu.ac.in>, "TMU Faculty Dr.Vipin Kumar" <drvipink.engineering@tmu.ac.in>
Tue, Jul 11, 2023 at 2:45 PM

Dear Sir,

Department of Physics, Faculty of Engineering is going to conduct a meeting for the Board of Studies (BoS) on dated 12th July, 2023 at 11am in **committee Room** to ensure effective curriculum development and syllabus revision and academic planning. The expert, **Prof. R. C. Srivastava, Professor & Head, Department of Physics**, is coming from **College of Basic Sciences and Humanities, G. B. Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, Uttarakhand**.

For your information please,

The department will discuss the following agenda items during the BoS meeting:

1. Beginning with the academic year 2023-24, the Department of Physics will propose a four-year B.Sc.(Hons.) Physics programme based on NEP-2020 and UGC standards.
2. Revision of all M.Sc. Physics laboratories for the approaching academic term 2023-24.
3. The Department will deliver a slightly revised course in Applied Physics (Course code: DIP112/202) for all Diploma branches.

Thanks & best regards

Dr. Amit K. Sharma
Head, Department of Physics
FoE, Teerthanker Mahaveer University
Moradabad 244001

Dr. Vipin Kumar <drvipink.engineering@tmu.ac.in>
To: TMU Staff Nikhil Saxena <nikhil.computer@tmu.ac.in>

Tue, Jul 11, 2023 at 3:34 PM

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Teerthanker Mahaveer University

Faculty of Engineering

Department of Physics

Minutes of Meeting- "Board of Study"

Dated: 12.07.2023

The meeting of the board of studies in Physics was held on 12.07.2023 at 11am in committee room, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad (UP).

Following departmental members were present in the meeting:

1. **Dr. Amit Kumar Sharma**, Associate Professor & Head, Department of Physics, Chairperson, FoE
2. **Dr. S. P. Pandey**, Professor, Department of Physics, FoE, BoS Member
3. **Dr. Ajay Kumar Upadhyay**, Associate Professor, Department of Physics, FoE, BoS Member
4. **Dr. Diptonil Banerjee**, Associate Professor, Department of Physics, FoE, BoS Member
5. **Dr. Pavan Kumar Singh**, Assistant Professor, Department of Physics, FoE, BoS Member
6. **Dr. Vishnu Prasad Shrivastava**, Assistant Professor, Department of Physics, FoE, BoS Member

One Expert from another University nominated by the Vice-Chancellor

Prof. R. C. Srivastava, Professor & Head, Department of Physics, College of Basic Sciences and Humanities, G. B. Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, Uttarakhand 263145, Mobile: +91-8077658344(M), Email ID – rcsri@rediffmail.com; rcsrivastava123@gmail.com

One member from another Department

Dr. Varun Kr. Singh, Associate Professor, Department of Chemistry, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad

Following points are discussed by the department in the BoS meeting held:

1. Department of Physics presented a four-year B.Sc.(Hons.) Physics programme with first year syllabus (**Annexure-I**) based on NEP-2020 and UGC standards. External experts and members of BoS agreed to the eight semesters structure with one year complete syllabus of B.Sc.(Hons.) Physics/ B.Sc.(Hons.) with Research, Core courses (MJC courses, MNCs, AECs, SECs, VACs, CCA, LPBEI, RP, DR, CEP, VC and summer internships (SI) for the academic session 2023-



24. Also they agreed on the distribution of courses credits, L+T+P, evaluation scheme and instruction notes for internship, Project.

Bachelor of Science (Hons./Hons. with Research) Physics

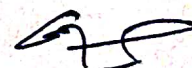
Basic Structure of Credits Distribution

S. No.	Type of Course	Minimum Credit Requirement				
		1-year Certificate	2-year Diploma	3-year Degree	4-Year UG (Hons.)	4-Year UG (Hons. with Research)
1	Major Core (MJC)	16	36	68	92	80
2	Minor Stream (MNC)	08	16	24	32	32
3	Multi-Disciplinary Course (MDC)	09	09	09	09	09
4	Ability Enhancement Courses (AEC)	04	08	08	08	08
5	Skill Enhancement Courses (SEC)	06	12	12	12	12
6	Value Added Courses (VAC)	08	08	10	10	10
7	Summer Internship (SI)	-	-	04	04	04
8	Research Project (RP)	-	-	-	-	12
9	Co-Curricular Activity (CCA)	01	02	03	03	03
10	Learning by Project Based Learning Entrepreneurial Initiative (LPBEI)	02	04	06	06	06
11	Deep Reading (DR)	01	01	01	01	01
12	Community Engagement Program (CEP)	-	-	01	01	01
13	Vocational Course (VC)	04*	04*	-	-	-
Total Credits		59	100	146	178	178

**Those students who want to exit after one or two years will compulsory complete the vocational course of 4 credits (120Hrs). It is not mandatory for the three- or four-year program.*

2. Department presented a revision of all laboratories courses (Annexure-II) as tabulated below of the M.Sc. Physics programme-

S. No.	Existing Syllabus 22-23 session		Proposed New Syllabus	
	Course name	Course Code	Course name	Course Code
1	Physics Lab-I	MPH161	General Physics Lab-1	MPH163
2	Physics Lab-II	MPH162	General Physics Lab-2	MPH263
3	Physics Lab-III	MPH261	General Physics Lab-3	MPH362
4	Physics Lab-IV	MPH262	Minor Project (4 credits in 3 rd Sem)	MPH393
5	Physics Lab-V	MPH361		




External experts and members of BoS agreed to revise and restructure the five labs according to the existing semester courses further department has added the recommended points as highlighted as above in the M.Sc. Programme for the academic session 2023-24.

3. Further, the Department presented a minor revision in the course of Applied Physics (Course code: DIP112/202) for Diploma programmes (all branches) as highlighted in the courses (Annexure-III) which is recommended by the BoS members.

4. Detail of Added & Deleted course:

S. No	Name & code of the courses added	Name & code of the courses deleted	Name & code of the courses where revision is not more than 20%	Name of the stakeholder from where the inputs have been received	Need /rationale to justify the revision
1	General Physics-1 (MPH163)	Physics Lab-I (MPH161)	Applied Physics (DIP112/DIP202)	Faculty, students, external and academic Professionals	Some of the experiments are poorly working or not repairable, so we revised all five mentioned lab into three new labs.
2	General Physics-2 (MPH263)	Physics Lab-II (MPH162)		Faculty, students and academic professionals	
3	General Physics-3 (MPH362)	Physics Lab-III (MPH261)			
4	Minor Project (MPH393)	Physics Lab-IV (MPH262)			
5		Physics Lab-V (MPH361)			

Meeting ended with a vote of Thanks.

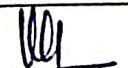
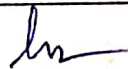
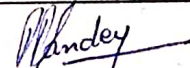

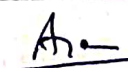

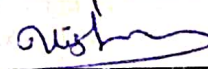
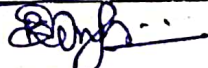
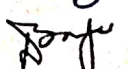

 Dr. Amit Kumar Sharma
 Head, Department of Physics
 Faculty of Engineering, Teerthanker Mahaveer University, Moradabad

Faculty of Engineering Attendance Sheet for BoS

Date: 12-07-2023

Department of Physics

Attendance Sheet

S. No.	External Expert/Chairperson/Faculty Name	Designation	Signature
1	Dr. R.C. Srivastava	Prof & HOD	
2	Dr. Vasun Kumar Singh	Associate Professor	
3	Dr. S. P. PANDEY	Professor	
4	Dr. Vipin Kumar	Ass. Prof.	
5	Dr. Ajay Kumar Upadhyay	Associate Professor	
6	Dr. Amit K. Sharma	Ass. Prof. & Head	
7	Dr. Vishnu P. Srivastava	Assistant prof.	
8.	Dr. Pawan Kumar Singh	Assistant Prof.	
9.	Dr. Dipankar Banerjee	Associate Prof.	

Current Syllabus

Course Code: DIP112/202	Diploma in Civil Engineering - Semester-I Applied Physics	L-4 T-0 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of physical quantities, select their units for the use in engineering solutions.	
CO2.	Understanding the concepts of vectors, scalars, parabolic motion, rotational motion, Inertia, rotation and friction.	
CO3.	Understanding the concepts of elasticity, simple harmonic motion, acoustics, optics and electromagnetic.	
CO4.	Applying the concept of vectors, scalars, theory of parabolic motion, rotational motion, Inertia and friction for useful purposes in real life.	
CO5.	Applying the concept of elasticity, simple harmonic motion, acoustics, optics and electromagnetic for engineering problems.	
Course Content:		
Foundation Course – Not for Grading	Units and Dimensions: S.I. Units & Dimensions of physical quantities. Dimensional formula and dimensional equation. Principle of homogeneity of dimensions and applications of homogeneity principle to: <ul style="list-style-type: none"> i. Checking the correctness of physical equations. ii. Deriving relations among various physical quantities. Conversion of numerical values of physical quantities from one system of units into another.	8 Hours
Unit-1:	Vector: Scalar and vector quantities: Addition, Subtraction; Cartesian components of vector, Scalar and vector product of two vectors. Force and Motion: Parabolic motion, projectiles thrown horizontally and at an angle, Ordinary Problems on time of flight, horizontal range, and vertical height, Gravitational force, Kepler's laws, Elementary concept of Escape velocity and geostationary satellite.	8 Hours
Unit-2:	Dynamics of Rigid Body (Rotational Motion): Rotational motion, Moment of inertia, Theorems of Perpendicular and Parallel axis of moment of inertia (Statement only), Radius of gyration, angular momentum, Conservation of angular momentum, Torque. Friction: Introduction, Advantage and disadvantage of friction, Static and dynamic frictional forces.	8 Hours
Unit-3:	Elasticity: Elasticity, stress and strain, Hook's law, elastic limit, Modulus of elasticity- Young's modulus, bulk modulus and modulus of rigidity. Simple Harmonic Motion: Periodic Motion, characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration, Simple pendulum and Derivation of their periodic time.	8 Hours
Unit-4:	Acoustics: Definition of pitch, loudness, quality and intensity of sound, Echo, reverberation and reverberation time. Optics: Quantum nature of light, Coherence, Duality of wave and particle, Elementary Concept of Interference, diffraction and polarization; Brewster's law and	8 Hours

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	Malus law.	
Unit-5:	Electrostatics: Electric Charges, Coulomb's law-force between two point charges, Electric field; electric field due to a point charge; Electric flux, statement of Gauss's theorem. Electric potential, potential difference, equi-potential surfaces. Electrodynamics: Ohm's law, Limitations of Ohm's law, Ampere's Law, faraday's law, Biot-Savart's Law.	8 Hours
<u>Text Books:</u>	1. Kumar Tyagi, <i>Applied Physics</i> , Navbharti Prakashan, Meerut.	
<u>Reference Books:</u>	1. Gaur R.K. & Gupta S. L., <i>Engineering Physics</i> , Dhanpat Rai Publication., New Delhi. 2. Gaur R.K. & Gupta S. L., <i>Applied Physics</i> , Dhanpat Rai Publication., New Delhi. 2. Kushwaha P. S., <i>Applied Physics</i> , Bharat Bharti Publications, Meerut. 3. Jain Vibha. <i>Applied Physics</i> , Dhanpat Rai Publication., New Delhi. * Latest editions of all the suggested books are recommended.	

REVISED proposed Syllabus

Course Code: DIP112/202	Diploma in Civil Engineering - Semester-I Applied Physics	L-4 T-0 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of physical quantities, select their units for the use in engineering solutions.	
CO2.	Understanding the concepts of vectors, scalars, parabolic motion, rotational motion, Inertia, rotation and friction.	
CO3.	Understanding the concepts of elasticity, simple harmonic motion, acoustics, optics and electromagnetic.	
CO4.	Applying the concept of vectors, scalars, theory of parabolic motion, rotational motion, Inertia and friction for useful purposes in real life.	
CO5.	Applying the concept of elasticity, simple harmonic motion, acoustics, optics and electromagnetic for engineering problems.	
Course Content:		
Foundation Course – Not for Grading	UNITS AND DIMENSIONS: I. Need of measurement and Unit in Engineering and Science, definition of Unit, fundamental and derived quantities and their units, different system of Units (CGS, MKS, FPS and SI), Illustrations. II. Definition of accuracy, precision and error, Estimation of Errors, absolute error, relative error and percentage error, rules and identification of significant figures with example. III. Conversion of numerical values of physical quantities from one system of units into another.	8 Hours
Unit-1:	Vector: Scalar and vector quantities: Addition, Subtraction; Cartesian components of vector, Scalar and vector product of two vectors. Force and Motion: Parabolic motion, projectiles thrown horizontally and at an angle, Ordinary Problems on time of flight, horizontal range, and vertical height, Gravitational force, Kepler's laws, Elementary concept of Escape velocity and geostationary satellite.	8 Hours
Unit-2:	Dynamics of Rigid Body (Rotational Motion): Rotational motion, Moment of inertia, Theorems of Perpendicular and Parallel axis of moment of inertia (Statement only), Radius of gyration, angular momentum, Conservation of angular momentum, Torque. Friction: Introduction, Advantage and disadvantage of friction, Static and dynamic frictional forces. Thermodynamics: Concept of heat and temperature, thermometer, its interval and fixed point, different scales of temperatures and their conversion formulae.	8 Hours
Unit-3:	Elasticity: Elasticity, stress and strain, Hook's law, elastic limit, Modulus of elasticity- Young's modulus, bulk modulus and modulus of rigidity.	8 Hours

	Simple Harmonic Motion: Periodic Motion, characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration, Simple pendulum and Derivation of their periodic time.	
Unit-4:	Optics: Quantum nature of light, Coherence, Duality of wave and particle, Elementary Concept of Interference, diffraction and polarization; Brewster's law and Malus law.	8 Hours
Unit-5:	Electrostatics: Electric Charges, Coulomb's law-force between two point charges, Electric field; electric field due to a point charge; Electric flux, statement of Gauss's theorem. Electric potential, potential difference, equi-potential surfaces. Electrodynamics: Ohm's law, Limitations of Ohm's law, Ampere's Law, faraday's law, Biot-Savart's Law.	8 Hours
<u>Text Books:</u>	1. Kumar Tyagi, <i>Applied Physics</i> , Navbharti Prakashan, Meerut.	
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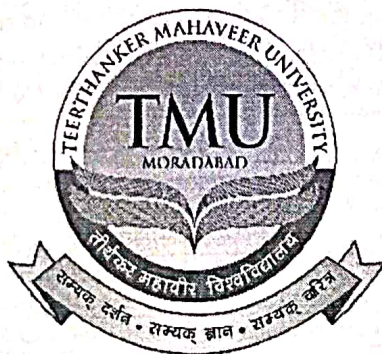
Study & Evaluation Scheme

of

Master of Science (Physics)

[Applicable for Academic Session 2023-24]

[As per CBCS guidelines given by UGC]



TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in



TEERTHANKER MAHAVEER UNIVERSITY
(Established under Govt. of U.P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P.)

Study & Evaluation Scheme	
SUMMARY	
Institute Name	Faculty of Engineering
Programme	M.Sc. Physics
Duration	Two Years full time (Four Semesters)
Medium	English
Minimum Required Attendance	75%
Credits	
Minimum Credits Required for Degree	95

Minimum Credits Required for Degree				95	
Assessment:					
Evaluation			Internal	External	Total
Theory			40	60	100
Practical/ Dissertations/ Project Reports/ Viva-Voce			50	50	100
Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendance & Participation	Total
Best two out of three					
10	10	10	10	10	40
Duration of Examination			External	Internal	
			3 Hours	1.5 Hours	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers' continuous evaluation. (i.e. both internal and external). A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

Provision for delivery of 25% content through online mode.

Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

Maximum no of years required to complete the program: N+2 (N=No of years for program)

Question Paper Structure

1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.

IMPORTANT NOTES:

1	The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).
2	Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.
3	There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.

Program Structure-M.Sc. Physics

A. Introduction:

The main goal of physics is to explain how things move in space and time and to understand how the universe behaves. It studies matter, forces and their effects. Physics is a science of nature which deals the various phenomena including our daily life as well as interaction at smallest scales. It is not only satisfies our curiosity to understand galaxy and universe but also the backbone of engineering and technology. The scope of physics is broadly divided into classical and modern physics. The key areas of classical physics comprise special relativity, classical mechanics, statistical mechanics, thermodynamics and EM theory. The modern physics deals quantum mechanics, atomic physics, nuclear particle physics, condense matter physics, laser physics etc. Development of new interdisciplinary subjects like nano-science, biophysics, and their applications from physics point of view added new dimension. Thus, the degree program in physics also intended to cover overlapping areas of physics with chemistry, biology, medical sciences and engineering. Further, subjects such as MATLAB studies can be helpful for students/faculty members to broaden their skills. Therefore, as a part of efforts to enhance employability, the curricula also include learning experience with industries and research laboratories as interns. In addition, national lab visits/industrial visits/projects are encouraged and added to the curriculum in order to enhance better exposure for research perspective. This modified syllabus drafted to enable the graduate prepare for national as well as international competitive examinations, such as GATE, UGC-CSIR NET, JEST, scientific officer exam in national research centers, UPSC Civil Services Examination as well as for GRE physics for aboard Ph.D. The Course is designed with several mathematical and computational tools along with domain knowledge enables them to develop several physical models required by various software as well as core industries which in turn enhances their job as well as entrepreneurship opportunities.

The programme structure and credits for M.Sc. are finalized based on the stakeholders' requirements and general structure of the programme. Minimum number of classroom contact teaching credits for the M.Sc. program will be 95 credits (one credit equals 1.0 hour) and Project and internship will be of (05+02) 07 credits. The minimum number of the credits for award of M.Sc. degree will be 95 credits. Out of 88 credits of classroom contact teaching, 54 credits are to be allotted for core courses (CC), 06 credits are allotted to Ability-Enhancement Compulsory Course (AECC), 06 credits are allotted to Skill-Enhancement Course (SEC), 12 credits are allotted to Program/Discipline Specific Elective Course (DSEC), 10 credits are allotted to Laboratory Course (LC), Credits distribution is given below in tabular form:



M.Sc. Physics: Two-Year (4-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S. No.	Type of Course	Credit Hours	Total Credits
1	Core Course (CC)	6 Courses of 5 Credits each (Total Credit Hrs. 6X5) 6 Courses of 4 Credits each (Total Credit Hrs. 6X4)	54
2	Ability-Enhancement Compulsory Course (AECC)	2 Course of 3 Credit each (Total Credit Hrs. 2X3)	06
3	Skill-Enhancement Compulsory Course (SECC)	1 Course of 2 Credit each (Total Credit Hrs. 1X2)	02
4	Program/Discipline Specific Elective Course (DSEC)	3 Courses of 4 Credits each (Total Credit Hrs. 3X4)	12
5	LC-Laboratory Courses	3 Courses of 2 Credits each (Total Credit Hrs. 3X2)	6
6	Skill Enhancement Course (SEC)	4 Courses of 1 Credits each (Total Credit Hrs. 4X1)	04
7	PROJ& Internship	1 Course of 5 Credit each (Total Credit Hrs. 1X5) 1 Course of 2 Credit each (Total Credit Hrs. 1X2) 1 Minor Project (Total Credit Hrs. 1X4)	07 + 04
8	MOOC-Optional (credits will consider only in case a student fails to secure minimum required credits for the award of degree)	As per approval from Hon'ble Vice chancellor	-
Total Credits			95

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our university.

The following is the course module designed for the M.Sc. program:

- **Core competency:** Core courses of M.Sc. Physics are intended to provide deep understanding and interpreting skill of physical information – verbally, mathematically and graphically. The theoretical study along with laboratory courses also provides the connection between theoretical knowledge taught in textbooks/homework problems and the experimental foundations of this knowledge. A wide range of core courses provides a deep understanding of classical as well as modern physics and train the students to analyses, interpret not only the physical phenomena but also develop their decision-making ability and contribute to the other area of life. The core courses include 12 theory Papers and 5 laboratory courses which covers both classical and modern Physics, classical mechanics, statistical physics, thermodynamics, electromagnetic theory and modern physics such as quantum physics, atomic & molecular physics solid state physics etc.

Program/Discipline Specific Elective Course (DSEC): The discipline specific elective course is chosen to make students specialist or having specialized knowledge of a specific domain like nano-science, astrophysics, plasma physics, electronic instrumentation and biophysics etc. Three discipline specific elective courses offered in III and IV semesters.

- **Ability Enhancement Compulsory Course (AECC):** As per the guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Ability Enhancement Compulsory Course (AECC) are suggested. To develop the ability of students for Research perspective one course of research methodology has been adopted.
- **Skilled communicator:** The course curriculum incorporates basics and advanced training in order to make a post graduate student capable of expressing the subject through technical writing as well as through oral presentation.
- **Critical thinker and problem solver:** The course curriculum also includes components that can be helpful to post graduate students to develop critical thinking ability by way of solving problems/numerical using basic & advance knowledge and concepts of Physics.
- **Sense of inquiry:** It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation.
- **Skilled project manager:** The course curriculum has been designed in such a manner as to enabling a post graduate student to become a skilled project manager by acquiring knowledge about mathematical project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.
- **Ethical awareness/reasoning:** A post graduate student requires understanding and developing ethical awareness/reasoning which the course curriculums adequately provide.
- **Lifelong learner:** The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.
- **Skill Enhancement Course (SEC):** A Skill Enhancement Course is a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be Two courses of Aptitude in Semester I, II semesters and two courses of Soft Skills in I&II Semesters and will carry credit.

C. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of two-years M.Sc. Physics:

PSO – 1	Understanding and learning the concepts in basic as well as certain advanced areas of Physics.
PSO – 2	Learning designing and performing experiments in the labs to demonstrate the concepts of principles learned in classrooms.
PSO – 3	Applying the knowledge acquired in the classrooms and laboratories to solve a wide range of problems in theoretical and experimental Physics.
PSO – 4	Analyzing the real-life problems and to seek their solutions using one's own knowledge & understanding related to Physics.
PSO – 5	Creating a critical attitude and logical reasoning among students to make them able for applying knowledge of physics in diverse fields

D. Pedagogy & Unique practices adopted:

“Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept”. In addition to conventional time-tested lecture method, the institute will emphasize on experiential learning:

- **Role Play & Simulation:** Role-play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Therefore, role-play & simulation exercises such as virtual share trading, marketing simulation etc. are being promoted for the practical-based experiential learning of our students.
- **Video Based Learning (VBL) & Learning through Movies (LTM):** These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through VBL & LTM is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL & LTM, wherever possible.
- **Field/Live Projects:** The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other their regular classes.
- **National Lab /Industrial Visits:** National Lab/industry visit are essential to give students hand-on exposure and experience of Research related area. Our institute organizes such visits to enhance

students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

- **MOOCs:** Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs. University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through only NPTEL could be given 2 credits for each MOOC course.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

- a) This is recommended for every student to take at least one MOOC Course throughout the programme.
 - b) There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
 - c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.
 - d) Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.
 - e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.
 - f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.
 - g) College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.
- **Special Guest Lectures (SGL) & Extra Mural Lectures (EML):** Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.
 - **Student Development Programs (SDP):** Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching

various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

- **Industry Focused programmes:** Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.
- **Special assistance programme for slow learners & fast learners:** write the note how would you identify slow learners, develop the mechanism to correcting knowledge gap. Terms of advance topics what learning challenging it will be provided to the fast learners.

- **Induction program:** Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.
- **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.
- **Extra-curricular Activities:** organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.
- **Career & Personal Counseling:** - Identifies the problem of student as early as possible and gives time to discuss their problems individually as well as with the parents. Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change.

Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance.

Strategies: a) Once in a week the counselors meet the students in order to inquire about problems. b) Available 24x7 on SOS basis.

- **Participation in Workshops, Seminars & writing & Presenting Papers:** Departments plan to organize the workshops, Seminars & Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. This participation would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as noncredit course.
- **Formation of Student Clubs, Membership & Organizing & Participating events:** Every department has the departmental clubs with the specific club's name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.
- **Capability Enhancement & Development Schemes:** The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling



• **Library Visit & Utilization of E-Learning Resources:** Student can visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.

- a) Institute Library & Information is subscribing online e-books and e-journals databases (DELNET and EBSCO host E-databases) as per the requirement of the institute and fulfilling AICTE norms. IP based access is given to all computers connected on campus LAN to access e-journals.
- b) For the effective utilization of resources, Information Literacy training programs are conducted to the staff and students.
- c) Wi-Fi enabled campus
- d) Regular addition of latest books and journals
- e) Well maintained e-library to access e-resources

Study & Evaluation Scheme

M.Sc. (Physics)-Semester I

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-1	MPH111	Mathematical Physics-I	4	1	-	5	40	60	100
2	CC-2	MPH112	Classical Mechanics	4	1	-	5	40	60	100
3	CC-3	MPH113	Quantum Mechanics -I	4	1	-	5	40	60	100
4	AECC-1	MAT115	Research Methodology	3	-	-	3	40	60	100
5	*LC-1	MPH163	General Physics Lab-I	-	-	4	2	50	50	100
6	SEC-1	TPC105	Advance Arithmetic & Reasoning	-	-	2	1	50	50	100
7	SEC-2	TPC102	Self Development of Scientists	-	-	2	1	50	50	100
8	DGP-1	MGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	15	3	8	22	410	390	800

*Some of the lab experiments may be conducted through virtually (<https://www.vlab.co.in/>)

M.Sc. (Physics)-Semester II

Sl. No.	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-4	MPH211	Mathematical Physics-II	4	1	-	5	40	60	100
2	CC-5	MPH212	Solid State Physics	4	-	-	4	40	60	100
3	CC-6	MPH213	Atomic & Molecular Physics	4	-	-	4	40	60	100
4	CC-7	MPH214	Quantum Mechanics –II	4	-	-	4	40	60	100
5	*LC-2	MPH263	General Physics Lab-II	-	-	4	2	50	50	100
6	SEC-3	TPC205	Advance Algebra and Data Management	-	-	2	1	50	50	100
7	SEC-4	TPC202	Soft Skills for Workplace Effectiveness of Scientists	-	-	2	1	50	50	100
8	DGP-2	MGP211	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	16	1	8	21	410	390	800

MOOC Course:

1	MOOC-1	MOOC12	MOOC Program –I (Optional)	-	-	-	2	-	100	100
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*Some of the lab experiments may be conducted through virtually (<https://www.vlab.co.in/>)

M.Sc. (Physics)-Semester III

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-8	MPH311	Electromagnetic Theory	4	1	-	5	40	60	100
2	CC-9	MPH312	Thermodynamics & Statistical Physics	4	-	-	4	40	60	100
3	CC-10	MPH317	Physics & Technology of Semiconductor Devices	4	-	-	4	40	60	100
4	AECC-2	MHM320	Human values & Professional Ethics	3	-	-	3	40	60	100
5	DSE-1		Discipline Specific Elective Courses Discipline Specific Elective Course-I	4	-	-	4	40	60	100
6	DSE-2		Discipline Specific Elective Courses Discipline Specific Elective Course-II	4	-	-	4	40	60	100
7	*LC-3	MPH362	General Physics Lab-III	-	-	4	2	50	50	100
8	INTERN	MPH 392	Industrial Training & Presentation	-	-	4	2	50	50	100
9	PROJ-1	MPH393	Minor Project	-	-	8	4	50	50	100
10	DGP-3	MGP311	Discipline & General Proficiency	-	-	-	-	100	-	100
Total				23	1	16	28	490	510	1000

MOOC Course:

1	MOOC-2	MOOC13	MOOC Program –II (Optional)	-	-	-	2	-	100	100
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*Some of the lab experiments may be conducted through virtually (<https://www.vlab.co.in/>)



M.Sc. (Physics)-Semester IV

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-11	MPH412	Electronic Communications	4	-	-	4	40	60	100
2	CC-12	MPH414	Nuclear & Particle Physics	4	1	-	5	40	60	100
3	DSE-3		Discipline Specific Elective Courses Discipline Specific Elective Course-III	4	-	-	4	40	60	100
4	SECC-1	MAT461	MATLAB Programming	-	1	2	2	50	50	100
5	PROJ-2	MPH492	Project	1	-	8	5	50	50	100
6	DGP-4	MGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	13	2	10	20	320	280	600

ELECTIVE COURSES OFFERED

S. No	Code	Course	L	T	P	Credit
Semester III-Discipline Specific Elective Course-I- (Any one)						
1	MPH313	Material Sciences	4	-	-	4
2	MPH315	Nano-science & Technology	4	-	-	4
Semester III-Discipline Specific Elective Course-II- (Any one)						
3	MSC012	Elementary Biophysics	4	-	-	4
4	MPH319	Electronic Instrumentation	4	-	-	4
5	MPH321	Analog and Digital Systems	4	-	-	4
Semester IV-Discipline Specific Elective Course-III- (Any one)						
6	MPH411	Plasma Physics	4	-	-	4
7	MPH413	Astrophysics	4	-	-	4
8	MPH431	Physics and our World	4	-	-	4
9	MPH415	Photonics	4	-	-	4

